National Advisory Committee for Aeronautics

Research Abstracts

CURRENT NACA REPORTS

NACA TM 1371

APPARATUS FOR MEASUREMENTS OF TIME AND SPACE CORRELATION. (Appareil de Mesures de la Correlation Dans le Temps et L'Espace). A. Favre, J. Gaviglio and R. Dumas. (Presented at eighth International Congress for Theoretical and Applied Mechanics, Istanbul, Aug., 1952) April 1955. 20p. diagrs., photos. (NACA TM 1371. Trans. from La Recherche Aéronautique, no. 31, Jan.-Feb., 1953, p. 37-44).

A brief review is made of improvements to an experimental apparatus for time and space correlation designed for study of turbulence. Included is a description of the control of the measurements and a few particular applications.

NACA TM 1387

THEORY OF REVERSIBLE AND NONREVERSIBLE CRACKS IN SOLIDS. (Teoriya obratimykh i neobratimykh treshchin v tverdykh telakh). Y. I. Frenkel. April 1955. 14p. diagrs. (NACA TM 1387. Trans. from Zhurnal Tekhnicheskoi Fiziki, v. 22, no. 11, Nov., 1952, p. 1857-1866)

The Griffith crack theory is reviewed and certain shortcomings of this theory are discussed. A new description for the shape of a crack is given which takes into account the atomic structure of material. Through consideration of the total energy of the system and the shape of the crack, expressions for crack behavior are derived which are considered to remedy the defects of the Griffith theory.

NACA TN 3216

COOPERATIVE INVESTIGATION OF RELATIONSHIP BETWEEN STATIC AND FATIGUE PROPERTIES OF WROUGHT N-155 ALLOY AT ELEVATED TEMPERATURES. NACA Subcommittee on Heat-Resisting Materials. April 1955. 92p. diagrs., photos., 13 tabs. (NACA TN 3216)

Extensive data are given relating properties of N-155 alloy under static, combined static and dynamic, and completely reversed dynamic stress conditions. Time periods for fracture ranged from 50 to 500 hours at room temperature, $1,000^\circ$, $1,200^\circ$, $1,350^\circ$, and $1,500^\circ$ F. The work was on a cooperative basis to help clarify the principles governing load-carrying ability of heat-resistant alloys at temperatures and conditions where both creep and fatigue can occur simultaneously. In view of the uncertainty in interpreting results of various types of fatigue tests, duplicate data were obtained from as many types of fatigue testing machines as could be arranged.

NACA TN 3270

EFFECT OF DISSOCIATION ON THERMODYNAMIC PROPERTIES OF PURE DIATOMIC GASES. Harold W. Woolley, National Bureau of Standards. April 1955. 19p. diagrs., tab. (NACA TN 3270)

A graphical method is described by which the enthalpy, entropy, and compressibility factor for the equilibrium mixture of atoms and diatomic molecules for pure gaseous elements may be obtained and shown for any dissociating element for which the necessary data exist. Results are given for hydrogen, oxygen, and nitrogen. The effect of dissociation on the heat capacity is discussed briefly.

NACA TN 3282

INTERGRANULAR CORROSION OF HIGH-PURITY ALUMINUM IN HYDROCHLORIC ACID. II - GRAIN-BOUNDARY SEGREGATION OF IMPURITY ATOMS. M. Metzger and J. Intrater, Columbia University. April 1955. 33p. diagrs., 4 tabs. (NACA TN 3282)

The variation in the rate of intergranular corrosion of single-phase high-purity aluminum in 20 percent hydrochloric acid as a function of iron content and final-annealing temperature is attributed to the segregation to atomic sites in the grain-boundary region of iron and possibly other impurity atoms. The experimental results are analyzed by reference to a distribution function, obtained by statistical mechanical methods, which gives the equilibrium fraction of certain sites in the boundary which are occupied by solute atoms in terms of the interaction energy for the segregation of the solute atoms at these sites.

NACA TN 3326

THE COMPRESSIBLE LAMINAR BOUNDARY LAYER WITH HEAT TRANSFER AND ARBITRARY PRESSURE GRADIENT. Clarence B. Cohen and Eli Reshotko. April 1955. 43p. diagrs., 2 tabs. (NACA TN 3326)

An approximate method for the calculation of the compressible laminar boundary layer with heat transfer and arbitrary pressure gradient, based on Thwaites' correlation concept, is presented. With the definition of dimensionless shear and heat-transfer parameters and an assumed correlation of these parameters in terms of a momentum parameter, a complete system of relations for calculating skin-friction and heat-transfer results. Knowledge of velocity or temperature profiles is not necessary in using this calculation method. When the method is applied to a convergent-divergent, axially symmetric rocket nozzle, it shows that high rates of

heat transfer are obtained at the initial stagnation point and at the throat of the nozzle. Also indicated are negative displacement thicknesses in the convergent portion of the nozzle; these occur because of the high density within the lower portions of the cooled boundary layer.

NACA TN 3351

PLASTIC DEFORMATION OF ALUMINUM SINGLE CRYSTALS AT ELEVATED TEMPERATURES. R. D. Johnson, A. P. Young and A. D. Schwope, Battelle Memorial Institute. April 1955. 76p. diagrs., photos., 3 tabs. (NACA TN 3351)

A study was made of plastic deformation of aluminum single crystals over a wide range of temperatures. Results are presented of constant-stress creep tests, constant-load-rate tests, and constant-load creep tests. The effect of crystal orientation on the operative slip system was determined. The effect of small amounts of prestraining was studied and two high-resolution X-ray techniques were used to detect and follow the strain. Light and electron microscopy were used to study the complex nature of slip bands and kink bands on specimens deformed at elevated temperatures.

NACA TN 3370

A SIMPLIFIED METHOD FOR CALCULATING AEROELASTIC EFFECTS ON THE ROLL OF AIRCRAFT. John M. Hedgepeth, Paul G. Waner, Jr. and Robert J. Kell. March 1955. 26p. diagrs., 4 tabs. (NACA TN 3370)

An approximate linearized lifting-surface theory is used in conjunction with structural influence coefficients to formulate a method for analyzing the aeroelastic behavior in roll of an aircraft. Rolling effectiveness and aileron-reversal speed are computed by the use of a Galerkin-type procedure. Results obtained for two example configurations by using this method are compared with the results obtained by using the more refined method of NACA TN 3067.

NACA TN 3373

THEORETICAL CALCULATIONS OF THE PRESSURES, FORCES, AND MOMENTS DUE TO VARIOUS LATERAL MOTIONS ACTING ON THIN ISOLATED VERTICAL TAILS WITH SUPERSONIC LEADING AND TRAILING EDGES. Kenneth Margolis. March 1955. 43p. diagrs., 10 tabs. (NACA TN 3373)

Expressions based on linearized thin-airfoil theory for supersonic speeds are derived for the velocity potentials and pressure distributions due to various lateral motions for a family of thin isolated vertical tails with arbitrary sweepback and taper ratio. Motions treated are steady rolling, steady yawing, constant sideslip, and constant lateral acceleration. For the particular cases of half-delta and rectangular vertical tails, forces and moments expressed in the form of stability derivatives are also derived and presented in simple charts. All results are, in general, applicable at those supersonic speeds for which both the tail leading and trailing edges are supersonic. End-plate effects for several of the derivatives are also considered.

NACA TN 3376

THE EFFECT OF CONTROL STIFFNESS AND FORWARD SPEED ON THE FLUTTER OF A 1/10-SCALE DYNAMIC MODEL OF A TWO-BLADE JET-DRIVEN HELICOPTER ROTOR. George W. Brooks and Maurice A. Sylvester. April 1955. 38p. diagrs., photo., 3 tabs. (NACA TN 3376)

Some tests have been made with a 1/10-scale dynamic model of a two-blade jet-drive helicopter to study the effects of blade-pitch-control stiffness and tip-speed ratio on the rotor blade flutter characteristics. The results showed that the flutter speed of the model blades was increased as the blade-pitch-control stiffness was increased and indicated that the structural blade modes of primary importance with respect to flutter were the first torsion mode and the flapping mode. The rotor speed at flutter was reduced slightly as the tip-speed ratio was increased from hovering to forward flight.

NACA TN 3383

INVESTIGATION OF THE TURBULENT BOUNDARY LAYER ON A YAWED FLAT PLATE. Harry Ashkenas and Frederick R. Riddell, Cornell University. April 1955. 57p. diagrs., photos. (NACA TN 3383)

Experiments carried out on three flat plates yawed 0°, 30°, and 45° with artificially fixed transition in a low-speed, low-turbulence tunnel are described. The effects of yaw on the velocity profile and on the direction of flow near the plate are found to be small. The boundary-layer displacement thickness on a yawed plate is found to grow in the streamwise direction at a rate slightly greater than it does on the unyawed plate; this is in contrast with the laminar case where the "independence principle" discovered by Prandtl and others leads to a substantially reduced rate of growth on yawed plates.

NACA TN 3392

TWO MINIATURE TEMPERATURE RECORDERS FOR FLIGHT USE. John V. Foster. April 1955. 13p. diagrs., photos. (NACA TN 3392)

Descriptions are given for two types of temperature recorders suitable for use with thermocouples on fighter-type aircraft. One is an electromechanical self-balancing potentiometer type; the other uses electronic feedback to achieve fast balance.

NACA TN 3393

AN EXPERIMENTAL INVESTIGATION OF THE BASE PRESSURE CHARACTERISTICS OF NON-LIFTING BODIES OF REVOLUTION AT MACH NUMBERS FROM 2.73 TO 4.98. John O. Reller, Jr. and Frank M. Hamaker. March 1955. 45p. diagrs., photos. (NACA TN 3393. Formerly RM A52E20)

Base pressure characteristics of related nonlifting bodies of revolution were investigated at free-stream Mach numbers from 2.73 to 4.98 and Reynolds numbers from 0.6×10^6 to 8.8×10^6. The basic body shape was a 10-caliber tangent ogive with a cylindrical afterbody. The variation of base pressure coefficient with free-stream Mach number and

Reynolds number was determined for laminar-, transitional-, and turbulent-boundary-layer flow. Some effects of body fineness ratio, nose-profile shape, and afterbody shape (boattail) were also included in the investigation.

NACA TN 3420

HYDRODYNAMIC TARES AND INTERFERENCE EFFECTS FOR A 12-PERCENT-THICK SURFACE-PIERCING STRUT AND AN ASPECT-RATIO-0.25 LIFTING SURFACE. John A. Ramsen and Victor L. Vaughan, Jr. April 1955. 20p. diagrs. (NACA TN 3420)

Results are presented from an investigation of the hydrodynamic tares and interferences acting on an NACA 66_1-012 airfoil-section surface-piercing strut and an aspect-ratio-0.25 modified-flat-plate rectangular lifting surface. The interference of the strut on the lifting surface was negligible except at very shallow depths, where it increased the lift and pitching moment slightly. Strut-tare effects were appreciable only on drag, where section-drag coefficients showed good agreement with data from previous tank and wind-tunnel tests. The surface-intersection drag coefficients were constant above the critical wave speed and showed fairly good agreement with wave-drag theory below the critical speed.

NACA TN 3426

AN EXPERIMENTAL STUDY OF ORIFICE COEFFICIENTS, INTERNAL STRUT PRESSURES, AND LOADS ON A SMALL OLEO-PNEUMATIC SHOCK STRUT. James H. Walls. April 1955. 23p. diagrs., photos. (NACA TN 3426)

Measurements of shock-strut internal pressures, telescoping velocity, and strut stroke were made during drop tests of a small oleo-pneumatic landing gear to determine the characteristics of the orifice and to show the relationships between internal strut pressures and the overall loads developed by the strut. The variation of the orifice coefficient with telescoping velocity and strut stroke is presented. Strut forces determined from internal-pressure measurements are compared with forces measured by an external dynamometer. Strut forces calculated from measured telescoping velocity and stroke time histories are evaluated, a constant orifice coefficient and isothermal air compression being assumed.

NACA TN 3428

GROUND-SIMULATOR STUDY OF THE EFFECTS OF STICK FORCE AND DISPLACEMENT ON TRACKING PERFORMANCE. Stanley Faber. April 1955. 21p. diagrs., photos. (NACA TN 3428)

Tests were performed on a ground simulator with one degree of freedom, pitch, to determine the desired magnitude of the control-stick forces and displacements in relation to the performance of a tracking task. The dynamics of the simulated airplane were typical of those of current fighters operating at low altitudes and at subsonic speeds and having an undamped natural frequency of 1/2 cycle per second and a damping ratio of approximately 0.8.

NACA TN 3429

STATIC STABILITY OF FUSELAGES HAVING A RELATIVELY FLAT CROSS SECTION. William R. Bates. March 1955. 29p. diagrs., tab. (NACA TN 3429. Formerly RM L9I06a)

The subject investigation contains results of force tests and flow surveys made in the Langley free-flight tunnel to determine the static stability characteristics of several fuselages having a relatively flat cross section and a high fineness ratio.

NACA TN 3430

ON SLENDER DELTA WINGS WITH LEADING-EDGE SEPARATION. Clinton E. Brown and William H. Michael, Jr. April 1955. 27p. diagrs. (NACA TN 3430)

The slender-body approximation of linearized compressible flow is applied to the problem of a delta wing in which flow separation occurs at the leading edges. The vortex sheets found in the real flow are approximated by concentrated vortices with feeding lattices, and an adaptation of Kelvin's theorem is applied to simulate the force-free nature of the vortex sheet. Computed pressure distributions and span loadings are presented, and the theoretical lift results are compared with the results of simple force tests made at a Mach number of 1.9.

NACA TN 3431

AN ANALYSIS OF THE STABILITY AND ULTIMATE COMPRESSIVE STRENGTH OF SHORT SHEET-STRINGER PANELS WITH SPECIAL REFERENCE TO THE INFLUENCE OF RIVETED CONNECTION BETWEEN SHEET AND STRINGER. Joseph W. Semonian and James P. Peterson. March 1955. 49p. diagrs., tab. (NACA TN 3431)

A method of strength analysis of short sheet-stringer panels subjected to compression is presented which takes into account the effect that the riveted attachments between the plate and the stiffeners have on the strength of panels. An analysis of experimental data shows that panel strength is highly influenced by rivet pitch, diameter, and location and that the degree of influence for a given riveting depends on the panel configuration and panel material.

NACA TN 3432

CIRCUMFERENTIAL DISTRIBUTION OF PROPELLER-SLIPSTREAM TOTAL-PRESSURE RISE AT ONE RADIAL STATION OF A TWIN-ENGINE TRANSPORT AIRPLANE. A. W. Vogeley and H. A. Hart. April 1955. 24p. diagrs., photos. (NACA TN 3432)

Flight tests on a twin-engine transport airplane have been made to determine the effects of fuselage-nacelle interference on the circumferential distribution of the rise in total pressure behind the propellers. The effects of this flow interference on the operation of a simple propeller-thrust indicator, which samples the total-pressure rise at two diametrically opposed points in the slipstream (to counteract the effects of variations in angles of pitch and yaw), have been investigated.

NACA TN 3434

A STUDY OF NORMAL ACCELERATIONS AND
OPERATING CONDITIONS EXPERIENCED BY
HELICOPTERS IN COMMERCIAL AND MILITARY
OPERATIONS. Marlin E. Hazen. April 1955. 34p.
diagrs., photos., 5 tabs. (NACA TN 3434)

An analysis is presented of the normal accelerations
and operating conditions encountered by two different
airmail helicopters and a military pilot-training
helicopter. Tables and graphs are used to illustrate
the effect of operating conditions on acceleration
levels, and a summary of all NACA helicopter VGH
data analyzed to date is included.

NACA TN 3446

EFFECT OF AMMONIA ADDITION ON LIMITS OF
FLAME PROPAGATION FOR ISOOCTANE-AIR
MIXTURES AT REDUCED PRESSURES AND ELE-
VATED TEMPERATURES. Cleveland O'Neal, Jr.
April 1955. 32p. diagrs., 3 tabs. (NACA TN 3446)

Limits were determined for isooctane, ammonia,
and mixtures of these two fuels with air at pressures
up to 400 mm Hg and temperatures from 60° to 400°
C. In the ternary mixtures, NH_3-air weight ratios
were 0.020 and 0.039. For all mixtures, the flam-
mable region (rich minus lean limit equivalence
ratio) broadened as the temperature was raised. The
flammable region of isooctane was roughly three
times that of ammonia. However, small additions of
ammonia to isooctane broadened the flammable
range up to an NH_3-air ratio of about 0.02; further
additions narrowed the range. Added ammonia was
completely consumed in lean mixtures; in rich mix-
tures about half of the ammonia was unburned.

NACA TN 3447

ANALYTIC DETERMINATION OF THE DISCHARGE
COEFFICIENTS OF FLOW NOZZLES. Frederick S.
Simmons. April 1955. 15p. diagrs. (NACA
TN 3447)

An analytic expression for the discharge coefficient
of flow nozzles is obtained by integration of an
approximation for the velocity profile through the
cross section of the nozzle. This expression shows
the discharge coefficient to be a function of the
Reynolds number and the geometry of the nozzle and
agrees well with published experimental data for
Reynolds numbers between 10^4 and 10^6.

NACA TN 3496

FLIGHT TESTING BY RADIO REMOTE CONTROL -
FLIGHT EVALUATION OF A BEEP-CONTROL
SYSTEM. Howard L. Turner, John S. White and
Rudolph D. Van Dyke, Jr. March 1955. 55p.
diagrs., photos., tab. (NACA TN 3496. Formerly
RM A52A29)

A comparison between manual control and remote
control showed that a beep-type, radio-remote-
control system was, in general, a satisfactory
means of control for conducting standard handling-
quality flight tests. The dynamic characteristics of
the airplane-autopilot combination and the selection
of the proper parameter adjustments are discussed.

BRITISH REPORTS

N-36289*

Aeronautical Research Council (Gt. Brit.)
DIFFUSION OF ANTISYMMETRICAL LOADS INTO,
AND BENDING UNDER, TRANSVERSE LOADS OF
PARALLEL STIFFENED PANELS. J. H. Argyris.
1954. 52p. diagrs. (ARC R & M 2822. Formerly
ARC 9662; Strut 1037)

The purpose of this paper is to present the general
theory of diffusion of antisymmetrical concentrated
end loads and edge loads into parallel stiffened
panels, including the theory of bending of a parallel
stiffened panel under arbitrary transverse loads.
By combining the results of this paper with the re-
sults on diffusion of symmetrical loads given in
R & M 1969 and R & M 2038 or in Appendix I to this
paper, it is possible to analyze the diffusion in a
parallel panel under any arbitrary load or edge
stress distribution.

N-36290*

Aeronautical Research Council (Gt. Brit.)
THE DETERMINATION OF THE PRESSURE DIS-
TRIBUTION OVER AN AEROFOIL SURFACE BY
MEANS OF AN ELECTRICAL POTENTIAL
ANALYSER. S. C. Redshaw. 1954. 40p. diagrs.,
photos., tabs. (ARC R & M 2915; ARC 15,733.
Formerly Boulton Paul Aircraft Ltd. Tech. Rept. 101)

The potential flow, both with and without circulation
around several thin wings has been studied by means
of a three-dimensional potential analyzer. It is
shown that, by using the normal assumptions made
in the exercise of the linear perturbation theory, it
is possible to obtain the pressure distribution for
small angles of attack, as well as the slope of the
lift-incidence curve, easily and rapidly. Experi-
ments are also described in which it was attempted
to remove the effect of boundary restraint in a man-
ner analogous to that used in a flexible walled wind
tunnel.

N-36381*

Royal Aircraft Establishment (Gt. Brit.)
BOUNDARY LAYER MEASUREMENTS ON 10° AND
20° CONES AT M = 2.45 AND ZERO HEAT TRANS-
FER. E. V. Davies and J. R. Cooke. November
1954. 62p. diagrs., photos., 2 tabs. (RAE Tech.
Note Aero 2314)

Transition from laminar to turbulent flow occurred
between 4 and 6 in. from the tip of the 10° cone at
Reynolds number between 10^6 and 1.4×10^6; the
layer on the 20° cone was laminar over its entire
length of 6 in. (Reynolds number = 1.4×10^6).
Results agree well with the flat plate solution of
Monaghan transformed by the theoretical cone-flat
plate relations of Hantzsche and Wendt, and Mangler.
The data for the turbulent boundary layer were
obtained from the 10° cone and comparison with flat
plate data indicates that the cone-flat plate relation
is within 6 percent of an empirical relation analogous
to the $\sqrt{3}$ laminar boundary layer factor.

N-36382*

Royal Aircraft Establishment (Gt. Brit.)
A FLIGHT INVESTIGATION OF THE WAKE BEHIND
A METEOR AIRCRAFT, WITH SOME THEORETICAL
ANALYSIS. D. R. Andrews. December 1954. 38p.
diagrs., photos., tab. (RAE Tech. Note Aero 2283)

The jet velocity falls to a negligible value by 200-300
feet behind the jet exit. Major disturbances behind
an aircraft are due to the trailing vortices and these
decay only slowly. Tests with a Vampire flying in
the wake show that the strength of these vortices has
fallen to about half its initial value by 8000 feet
behind the aircraft. Theory and flight tests show
that the rolling moment imposed on a tracking air-
craft constitutes the most severe disturbance from
these vortices, and in some cases this rolling
moment can be large enough to overpower the aileron
control of the tracking aircraft.

N-36383*

Royal Aircraft Establishment (Gt. Brit.)
CURRENT INTERRUPTION OF D. C. CIRCUITS IN
AIR AT LOW PRESSURES, WITH SPECIAL REFER-
ENCE TO THE ARC CHARACTERISTIC BETWEEN
SILVER ELECTRODES. A. H. M. Arnold and L. H.
Ford. July 1954. 34p. diagrs., 11 tabs. (RAE
EL. 1485)

Measurements have been made of the voltage and
current in d-c arcs over a range of air pressures
using silver, copper, and tungsten electrodes. The
investigation has shown that although the arc charac-
teristic at low pressures is less favorable for break-
ing large currents than it is at atmospheric pressure,
comparable switch performance may usually be ob-
tained either by an increase of gap length, or by an
increase in the number of series breaks. Simple
empirical relationships for the arc characteristics
based on the experimental data obtained are given
for silver and tungsten electrodes: tests on the
interrupting capacity of switches gave results which
were in reasonable agreement with predictions made
from these empirical formulas.

N-36385*

Royal Aircraft Establishment (Gt. Brit.)
SOME EXPERIMENTS ON RATES OF QUENCHING.
F. J. Bradshaw and S. Pearson. October 1954.
11p. diagrs. (RAE Tech. Note Met. 203)

Experiments are described on the quenching rates
of 6.4 mm diameter cylindrical specimens in water
at various temperatures. Similar work is described
using cylinders and wires (1.2 to 0.3 mm) quenched
in liquids held at temperatures below 0° C. Appro-
priate mean values of surface heat transfer coeffi-
cients are deduced.

N-36386*

Royal Aircraft Establishment (Gt. Brit.)
28 S. W. G. TITANIUM SHEETING FOR FIREPROOF
BULKHEADS. J. T. Ballett. September 1954. 7p.
photos., 2 tabs. (RAE Tech. Note Met. 202)

Tensile and bend tests were made on 28 S. W. G
(0.015 in.) Ti 75A titanium sheet in the annealed
condition and also after exposure in a furnace at
1000° C for 5 minutes. Exposure tests were also
carried out using two different types of torch flames.
The results showed that the heating to 1000° C
increased the tensile strength of the material by
about 20 percent to 49 tons/sq in., with an accom-
panying reduction in elongation from 28 percent to
4 percent.

UNPUBLISHED PAPERS

N-35767*

SELECTIVITY IN THE FORMATION OF FATIGUE
CRACKS DURING THE WORKING OF STEEL IN A
CORROSIVE MEDIUM; AND ADSORPTIVE BEGIN-
NING OF THE CORROSIVE FATIGUE OF METALS.
(Pro Vibirnist' v Utvorenni Trishchin Vtomi pri
Roboti Stali u Koroziynomu Seredovishchi, and
Adsorbtsiinii Pochatok Koroziinoi Vtomi Metaliv).
G. V. Karpenko. 11p. diagrs., photos. (Trans.
from Akademiia Nauk URSR, Kiev, Dopovidi, no. 2,
1951, p. 112-119)

In part I, steel was tested under reversed torsion in
air and aerated water. Transcrystalline cracks
perpendicular to the maximum tensile stress were
observed. All cracks were found to be normal to
the surface. In part II, the effects of an actively
corrosive media as well as a superficially corrosive
one were considered.

N-35826*

Univ. of Calif., Berkeley. Institute of Engineering
Research. A MACH 3.106 TWO-DIMENSIONAL
ADJUSTABLE NOZZLE FOR LOW DENSITY FLOW
(NO. 10 NOZZLE). L. Talbot. February 18, 1954.
(iii), 29p. diagrs., photos., 3 tabs. (Univ. of Calif.,
Berkeley. Institute of Engineering Research.
HE-150-120)

Following the results of tests conducted in a small
wind tunnel, a Mach 3.106 adjustable throat two-
dimensional nozzle was designed for the No. 3 Wind
Tunnel of the Low Pressures Project. The nozzle
measured 11.05 in. from throat to exit and, includ-
ing boundary-layer corrections, had exit dimensions
of 3.899 in. x 4.116 in. Test section Mach numbers
from 2.50 to 6.53 were produced by varying the noz-
zle throat height. The uniform flow region decreas-
ed with increased Mach number; at the highest Mach
number the nozzle was completely filled with bound-
ary layer.

N-35827*

Polytechnic Institute of Brooklyn. THE NON-
LINEAR DEFLECTION OF INFINITE STRIP PLATES.
F. S. Shaw, F. Pohle and N. Perrone. June 1953.
16p. diagrs., tab. (Polytechnic Institute of Brooklyn.
PIBAL 225)

By expressing the von Kármán plate theory entirely
in terms of displacements, there result three simul-
taneous nonlinear governing equations. These are
not readily soluble. If, however, the plate is taken
to be an infinite strip, and the loading to vary on in
the finite direction, solutions can be obtained for a
variety of loading cases. This restricted class of
problems is discussed here, and the solution for the
case of uniform loading is considered in all detail.

N-35828[*]

Polytechnic Institute of Brooklyn. THE NON-
LINEAR DEFLECTION OF AN INFINITE STRIP
MEMBRANE. N. Perrone, F. Pohle and F. S. Shaw.
April 1953. 13p. diagr. (Polytechnic Institute of
Brooklyn. PIBAL Rept. 219)

The problem of the nonlinear deflection of a mem-
brane having the shape of an infinite strip is consid-
ered. By setting up the problem in terms of dis-
placement components, it is shown that it is possible
to obtain exact, simple, closed form solutions for a
variety of loading cases which are subject to the
restriction that variation is in the finite direction
only.

N-35829[*]

Univ. of Okla. Research Institute. FLAME STA-
BILIZATION RESULTING FROM CYCLONIC FLOW
IN MIXTURES OF NATURAL GAS AND AIR. Lyle F.
Albright and Lloyd G. Alexander. (Final rept. for
period June 4, 1952 to June 30, 1954). viii, 108p.
diagrs., photos., 26 tabs. (Univ. of Okla. Research
Institute)

The application of cyclonic flow to the combustion of
natural gas-air mixtures in emergent cyclonic free
jets, ducts, and diverging sections has been inves-
tigated. The investigation consists of quantitative
measurements to determine the characteristics and
stability limits of the flames obtained. In addition,
directional impact and static pressure tube measure-
ments were made in the flow fields of emergent
cyclonic free jets, so that the explanation to flame
stabilization due to cyclonic motion could be con-
clusively established.

N-35830[*]

Brown Univ., Providence, R. I. Div. of Applied
Mathematics. REMARKS ON TRANSFORMS AND
BOUNDARY VALUE PROBLEMS. P. Germain.
June 1954. 34p. (Brown Univ., Providence, R. I.
Div. of Applied Mathematics)

An attempt is made to show the relations between
transforms and simple boundary value problems.
Some general formulas show in fact that the Fourier
integral theorem, the Fourier Dini integral theorem
and many of the consequences which can be derived
from them may easily be generalized. The same
formulas can be applied as well to elliptic as to hy-
perbolic problems. It does not seem to be possible
to obtain correspondingly simple results for the case
of problems related to an equation of mixed type.
As an application of the approach, the interpretation
of a result, called a generalized Hankel Transform,
was made precise. The method and the results may
be extended to the case of finite transforms.

N-35831[*]

Brown Univ., Providence, R. I. Div. of Applied
Mathematics. AN EXPRESSION FOR THE GREEN'S
FUNCTION FOR A PARTICULAR TRICOMI PROB-
LEM. P. Germain. June 1954. 34p. diagrs.
(Brown Univ., Providence, R. I. Div. of Applied
Mathematics)

The Tricomi equation is written with new indepen-
dent variables; this new form allows one to write
the Green's function for a special Tricomi problem
in the form of a Mellin Transform. The analysis is
greatly simplified by the use of a technique previously
used by R. Bader and the author. Corresponding
formulas for the doublet are given. These results
are given in a form which can be used for numerical
computation. Using the same method, a generalized
Tricomi problem is discussed. The results may be
used in order to simplify the existence proof for a
solution of a Tricomi problem for the Tricomi
equation.

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